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majority needs substantial improvement. The Department of Municipalities has drawn up a five-year program to provide or extend water supply systems for 114 municipalities with a total population of 943,000 people. Since such water systems are technically simple and the need is great, the Mission suggests that the Department be authorized to proceed with this program. Water supply systems for villages must, of course, be simple and inexpensive. In some cases, wells may prove to be the solution, although frequently brackish water is encountered; in other cases, water piped from a stream or canal with the help of a small pump and run through simple filters may be possible.

Outside of Baghdad and Basra municipal power plants are generally inadequate, and a considerable number of municipalities with a total population of 175,000 have no electricity at all. Baghdad and Basra, which together account for a generating capacity of 51,000 kilowatts, have a sufficient supply; and Kirkuk is adequately supplied from the large power plant of the Iraq Petroleum Company. Total generating capacity available in the remaining municipalities, however, is only 14,000 kw. A program for the expansion of this capacity and the provision of electricity for all municipalities would involve the installation of generators with an aggregate capacity of 10,000 kw. It would be desirable to proceed with such a program, provided simultaneous steps were taken to improve the management of municipally-owned power plants outside Baghdad and Basra. In these two cities the power plants are owned and managed efficiently by a private company and the Port respectively. At present the machinery in the plants of other municipalities is poorly maintained and little or no attention is paid to depreciation. Power "losses" are as high as 36 percent compared to not more than eight percent in Baghdad and Basra; and the rates charged range from 30 to 55 fils[4] per kw-hr as contrasted with 18 fils and less in Baghdad and Basra. To remedy these evident deficiencies it is recommended that serious consideration be given to entrusting the management of such plants to a competent private firm like the Baghdad Light and Power Company.

The Mission does not believe that it would be economic to develop hydroelectric power at present. The capital cost of hydro-

[4] One dinar equals one thousand fils.

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electric plants is considerably greater than that of equivalent thermal capacity; and Iraq possesses very cheap fuel for the generation of power. At present municipal power is used primarily for lighting, and even if industrial plants should turn increasingly to municipal stations for their power supply they would be able to obtain considerable amounts of "off-peak" power in such cities as Baghdad and Basra without any increase in generating capacity. In the judgment of the Mission hydroelectric power should be considered only if it does not need to be transmitted over long distances and then only if the demand is such as to insure a steady and high load factor. It is not yet clear that the Wadi Tharthar depression will actually store enough water to permit the generation of power, and the power which might be generated at the dams projected elsewhere is likely to be too far removed from major consuming centers.

VII. Education

Education is a basic condition for the agricultural, industrial and technological progress of the country as well as for the development of a fuller cultural life and the sound growth of democratic institutions. Its importance has received growing recognition and considerable progress has been made. In years of financial stringency the budget for education has usually continued to expand while other government expenditures were curtailed. In the last two decades, the number of schools rose from 262 to 1,100, the number of pupils from 32,750 to 175,000 and the number of primary school teachers increased from 1,325 to 6,588. During the same period, expenditures on education rose from about ID 300,000 per year to well over ID 4,000,000—a not inconsiderable advance even after taking into account the rise in prices.

Nevertheless, there are still only 175,000 children in schools out of about 750,000 of school age. Despite the increased emphasis on primary education, expenditures for this purpose still take only 51 percent of the education budget. The number of children in school declines sharply with each succeeding grade, so that only about half the children starting in primary school actually finish their

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marily because the capital cost of all the electrical equipment is eliminated. It is chiefly for this reason that there are over 3,000 large diesel-driven irrigation pump installations along the Tigris and Euphrates Rivers, many of them very close to electric generating stations. In a similar manner, most of the older industrial enterprises and even many of the new ones have followed the same practice of using diesel engines as a source of power. In the field of public transportation, diesel or gasoline engines are universally used as a means of motive power, while kerosene and other fuels meet the country's needs for domestic heating and cooking. It is not surprising, therefore, to find the development of electric power to be on a very small scale and the per capita consumption among the lowest in the world; the total generating capacity in utility plants operating for public use is not more than 65,000 kw. Of this 42,000 kw. serves the city of Baghdad and 9,000 kw. is at Basra

Production and distribution of electricity in Baghdad are carried on by the Baghdad Light and Power Company and in Basra by the Port Authority. In Kirkuk the municipality receives its power from the Iraq Petroleum Company's large plant but is responsible for distribution. In all other municipalities, the electricity system is run by the local Electricity Board.

Recent expansions by the Baghdad Light and Power Company and by the electric plant in Basra appear to be adequate for the immediate future, unless new industries or other heavy loads create power demands beyond those now anticipated. Apart from Kirkuk, however, the remaining municipalities are badly in need of power. To meet this need, the Department of Municipalities has established a plan of development which is very practical. This plan calls for the construction of new plants in approximately 56 municipalities having an aggregate population of 175,000 and the expansion of existing plants in 47 municipalities having an aggregate population of approximately 750,000. All plants would be based on the use of relatively small, slow-speed, heavy-duty, diesel-engine generators having a combined capacity of not over 10,000 kw. Fortunately, many of the generating units would be identical, permitting standardization and allowing maintenance to be carried out by central repair facilities. It is estimated that the total cost including

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365 371 distribution systems would be approximately ID 1,550,000, of which ID 1,000,000 would be in foreign exchange, mostly sterling. The financing of this development will need to be undertaken by the Development Board.

365 It is important, however, that expansion of supply be accompanied by thoroughgoing measures to assure more efficient management. The only utilities that can be said to be operated efficiently are those at Baghdad and Basra. In spite of a considerable burden on its revenue (see Annex D, *Industry*), the Baghdad Light and Power Company charges the lowest rates in the country, pays regular dividends to its stockholders and finances plant expansions from reserves set aside for such purposes.

Rates charged by the municipally-owned plants vary widely, and, generally speaking, are twice those in either Baghdad or Basra. In some localities, the demand for power is so much greater than supply that rates are made exceptionally high for the purpose of discouraging the normal use of electricity by large consumers. Distribution losses are frequently as much as 36 percent and because of poor maintenance an engine generator is seldom capable of operating at more than 50 percent of its designed rating. Records are also very poor and in some cases nonexistent. It is obvious, therefore, that the present form of administration is unsatisfactory and must be changed if the consumer of electricity is [471] to be adequately served. It is recommended, therefore, that all publicly-owned electric utilities be placed under the management of a competent private firm like the Baghdad Light and Power Company by means of a mutually satisfactory operating contract. The contract should require all operations to be conducted in accordance with sound utility practices and it should include some incentive to reduce rates to the level now enjoyed in Baghdad and Basra.

371 375 It has sometimes been argued that hydroelectric power should be developed as part of the projected water-storage schemes. While the possibility of such development undoubtedly exists, the Mission believes that thermal plants are at present the most economic source of power in Iraq. Hydroelectric plants require a much higher capital investment than thermal plants. They tend to be economical only where fuel costs are relatively high and there is

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a comparatively high and steady demand for power. In Iraq, however, fuel is very cheap and electricity is principally used for lighting so that the load factor is low. Moreover, hydroelectric power would have to be transmitted at considerable expense over long distances to the principal centers of consumption, since the potential hydroelectric power sites are all in the North. The possibility of developing hydroelectric power in connection with the Wadi Tharthar project nearer Baghdad appears problematic.